



Carbon Sequestration

By Andrea Denka

In an effort to decrease the amount of carbon dioxide in the atmosphere, states are becoming more interested in the feasibility of transferring carbon that is in the air back into the earth for long-term storage, which is called carbon sequestration. This *issue brief* provides information on the carbon cycle, carbon sequestration, carbon farming, and the legislative efforts to promote carbon farming.

The Carbon Cycle

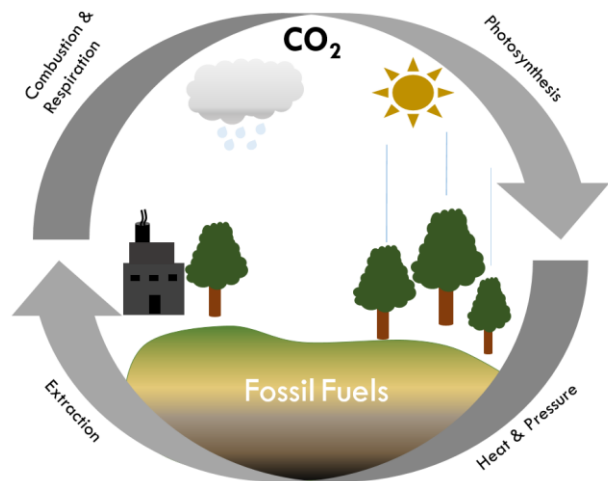
The carbon cycle is the biological cycle that describes how carbon moves throughout the environment. Carbon is a naturally occurring element that is found throughout nature, including in oceans and plants. Carbon is also found in the atmosphere as carbon dioxide.

Carbon helps regulate the Earth's temperature, helps plants grow, and creates a variety of energy sources, like coal, when buried underground. Since carbon is utilized and found throughout the environment, it is constantly cycling from the atmosphere to the Earth and back into the atmosphere through the carbon cycle.

Carbon occurs naturally in the environment, but there are some concerns from organizations like the Environmental Protection Agency (EPA) that there is too much carbon dioxide in the air, and not enough being stored in the Earth. This carbon imbalance may cause negative environmental impacts such as more frequent intense storms, higher temperatures, and less snowpack accumulation during winter.

Figure 1 illustrates the carbon cycle. Trees use sunlight and carbon dioxide to create food, which is called photosynthesis. Once a tree dies, all of the carbon it absorbed over its lifetime is released into the soil. This carbon is buried, and after many years, the pressure and heat from numerous layers of soil creates fossil fuels such as coal. The coal is then extracted and burned as an energy source, which releases the carbon back into the atmosphere as carbon dioxide. Trees also release carbon as carbon dioxide through respiration, which is how trees create energy. This carbon dioxide is then absorbed by trees during photosynthesis and the carbon cycle begins again.

Figure 1
The Carbon Cycle



Source: Legislative Council Staff

Carbon Sequestration

Carbon sequestration is the process of capturing and storing carbon dioxide. It happens naturally as a part of the carbon cycle, but can also be done

through various technologies and methods as a climate mitigation tool. Several federal agencies, such as the EPA, Department of Energy, Department of Agriculture (USDA), and Department of Interior (DOI) are involved in efforts to address carbon sequestration. Two methods of carbon sequestration are carbon capture and storage (CCS) and biological sequestration, which are discussed in the following paragraphs.

Carbon capture and storage. CCS is a method of carbon sequestration that focuses on capturing carbon dioxide from where it is emitted and injecting it underground in a secure location. Currently, the EPA is studying the implementation of CCS through its Greenhouse Gas Reporting Program. According to the EPA, there are over 120 facilities in the United States that are implementing CCS, which includes natural gas plants, paper mills, and breweries. More information on the CCS program can be found here: <https://www.epa.gov/ghgreporting/capture-supply-and-underground-injection-carbon-dioxide>

Biologic sequestration. According to DOI, biological or terrestrial sequestration is typically accomplished through forest and soil conservation practices that enhance the storage of carbon or reduce carbon dioxide emissions. Biological sequestration can be done through planting trees, preventing livestock from overgrazing grasslands, suppressing wildfires, and reducing crop burning. In the United States, biological sequestration is often used to meet a variety of land-management objectives. However, potential issues with biological carbon sequestration include the uncertain capability of ecosystems to sequester additional carbon; susceptibility to fire, disease, changes in climate, and land use; and potential decreases in crop production.

Carbon Farming

There has been growing interest in implementing new agricultural techniques to increase the amount

of carbon that can be stored in the land. Carbon farming is a term used to describe implementing methods on farms that increase the amount of carbon that the land absorbs. Some examples of carbon farming techniques include:

- practicing no-till farming;
- rotating the crops planted every season;
- growing cover crops during the off-season;
- using compost as soil; and
- minimizing livestock methane emissions.

While carbon farming has been promoted as a method to increase carbon sequestration, the USDA states that carbon farming may also improve soil health, restore degraded ecosystems, and enhance crop production.

Carbon Farming Legislation

The following paragraphs highlight examples of recently enacted legislation related to carbon farming.

U.S Congress. President Trump signed the federal Agricultural Improvement Act of 2018, commonly known as the Farm Bill, on December 20, 2018. The bill modifies the USDA programs and authorizes the Secretary of Agriculture and the Secretary of Energy to award grants to specific organizations that provide education about the benefits of implementing carbon sequestration to rural communities and agricultural producers.

Hawaii. House Bill 18-2182, which was signed by the Governor on June 4, 2018, creates the greenhouse gas sequestration task force. This task force is authorized to study long-term strategies for increasing greenhouse gas sequestration in agricultural operations.

Nebraska. Legislative Bill 19-243, which was signed by the Governor on April 17, 2019, creates the healthy soil task force, which is authorized to develop an action plan that coordinates state agricultural efforts, including using soil to capture and sequester carbon.